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ELECTROACTIVE POLYMERS AS ARTIFICIAL MUSCLES CHANGING ROBOTICS PARADIGMS

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ABSTRACT

For many years, electroactive polymers (EAP) received relatively little attention due to the small number of available materials and their limited actuation capability. The recent emergence of EAP materials with large displacement response enabled great potentials for these materials. The main attractive characteristic of EAP is their operational similarity to biological muscles, particularly their resilience and ability to induce large actuation strains. Unique robotic components and miniature devices are being explored, where EAP serve as actuators to enable new capabilities. These new capabilities are changing the paradigm of robotics in terms of components and performance. In recognition of the need for international cooperation among the developers, users and potential sponsors, an SPIE Conference was organized for the first time on March 1-2, 1999, in Newport Beach, California. The conference was the largest ever on EAP, and it marked an important milestone, turning the spotlight onto these emerging materials and their potential. Following this success, an MRS conference was initiated to address the fundamental issues related to the material science of EAP. The WW-EAP newsletter was initiated to bring the worldwide EAP community even closer. A homepage was also created to link worldwide EAP research and development facilities websites. In this paper, the current capabilities and potentials as well as the challenges of state-of-the art EAP will be reviewed.